DOCUMENT RESUME

ED 135 321 HE 008 692

AUTHOR Van Alstyne, Carol
TITLE Comments on "The Financial State of Higher Education: A Special Report."
PUB DATE Oct 76
NOTE 19p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Colleges; Discriminant Analysis; *Educational Economics; *Educational Finance; Evaluation Criteria; Financial Policy; *Financial Problems; *Higher Education; Information Sources; Logic; National Surveys; Periodicals; Private Colleges; Standards; State Colleges; State Universities; *Statistical Analysis; Textual Criticism; Universities; *Validity
IDENTIFIERS Change (Magazine); HEGIS, Higher Education General Information Survey

ABSTRACT

This memorandum contains a response to an article in "Change" magazine by Andrew Lupton, John Augenblick, and Joseph Heyison, September 1976. The article presented the results of a study grouping a national sample of colleges and universities into categories according to their financial health. The author's reservations about the "Change" analysis extend to the period of time covered by the study, the sample of institutions included, narrowness of the information base, application of discriminant analysis, arbitrariness of the scale of financial health, circularity in the model, measures of statistical confidence that were reported, use of the same indicators for both private and public institutions, interpretation of the key health indicators used, reliance on HEGIS data, and treatment of the panel ratings as a consensus on financial indicators. (MSE)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED135321

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

To: Stephen K. Bailey
Vice President

From: Carol Van Alstyne
Chief Economist

Date: October 1976

Subject: Comments on "The Financial State of Higher Education: A Special Report," by Andrew Lupton, John Augenblick, and Joseph Heyison, Change, September 1976.

Change magazine has just published the results of a study by the staff of the New Jersey Commission on Financing Postsecondary Education in which a national sample of colleges and universities was grouped into five categories according to their financial condition, ranging from "healthy" to "unhealthy." These are the kinds of summary conclusions which are being widely quoted from the report:

-- Almost one-half of all academic institutions can be considered to be in an unhealthy condition. (p. 25)

-- Private institutions exhibit a severe skew toward the unhealthy end of the scale, with almost three out of every five schools in Category D [relatively unhealthy]. (p. 23) [An accompanying chart shows 86.6 percent of the private institutions in the two unhealthy categories.]

In response to your questions about the validity of the Change report, I would say that the basic idea of combining the opinions of a panel of economic and financial analysts about what constitutes college and university financial health, with statistical procedures to identify indicators and group institutions by apparent financial condition, is a genuinely new approach which is worth pursuing. This approach, along with a number of others, can be usefully tried for the important purposes of developing concepts of institutional health and exploring the potential and the limits of existing data for policy-oriented financial analysis. The authors and the publisher of Change

HE008692

magazine simply went too far, too fast, in drawing conclusions intended to influence management decisions and public choices affecting the financing of higher education.

My reservations about the analyses are listed here. Most of the deficiencies could be remedied by refinement of the use of panel opinion and by further statistical and, most important, further conceptual work. Making improvements in the methodology, however, may well require the authors to revise some of their sweeping conclusions.

Period Covered by the Study

The opening paragraphs refer to "this 1976 report" and state that "over the last half year ... we have been able, in effect, to take a fluoroscopic picture of the state of American higher education," implying that the analysis covers current financial conditions. But actually the report is based on data for fiscal years 1972 through 1974: that is, for a period ending (for most institutions) in June 1974, more than two years ago. The Lanier-Andersen report on financial conditions of both public and private institutions has data for fiscal 1975, and the most recent Bowen-Minter report on a panel of 100 private institutions has some data for 1976.1/

1/ Bowen, Howard R. and W. John Minter, Private Higher Education, First Annual Report on Financial and Educational Trends in the Private Sector of American Higher Education, Association of American Colleges, November 1975, Washington, D. C.

_____, Private Higher Education, Second Annual Report on Financial and Educational Trends in the Private Sector of American Higher Education, Association of American Colleges, May 1976, Washington, D. C.

Lanier, Lyle H. and Charles J. Andersen, A Study of the Financial Condition of Colleges and Universities, American Council on Education Special Report, Office of Administrative Affairs and Educational Statistics, October 1975, Washington, D. C.

Text and captions reporting, for instance, that the condition of most private colleges and universities "has dramatically worsened" when compared with that of publicly supported institutions, imply that financial trends in the two sectors have been compared systematically. But it is not clear how explicitly trend analysis has been incorporated into the discriminant analysis employed in the study. Of the 16 variables used to characterize the health of institutions, only four are trend variables; two describe types of institutions, and the ten financial ratios relate to a single year, fiscal 1974.

The period of years covered in the financial analysis is also extremely important: Interpreting trend data for higher education requires taking into account the impact of general economic cycles on the health of academic institutions. Though the authors of the report recognize the importance of this impact, they do not make clear what bearing general economic conditions during the period covered by their data have on interpretation of their findings. In 1972, the economy was moving out of the contraction of the early 1970s; in 1974, it was moving into the contraction of the mid-1970s. To take business cycle phenomena more adequately into account would require either selecting for analysis a period that corresponds to at least one full cycle or else modifying the interpretation of the trend data so as to offset the distortions that result from starting the period of analysis close to a peak in a cycle and ending it close to a trough.

A classic shortcoming of financial analysis for higher education is information lags, which may be of sufficient magnitude to render any policy prescriptions completely out of phase with contemporary realities.

Sample of Institutions Included in the Study

In this study, a random sample of 50 institutions was drawn from the total institutional population, and another five institutions were subsequently added for better coverage of private and graduate-level institutions. But, in cases where the population to be studied is not homogeneous and where adequate representation of the components of the population is important, standard sampling technique requires, instead, that the initial sample be stratified. With a stratification design, the total sample is made of carefully drawn subsamples of each subgroup to be included in the analysis. Throughout the study, inadequate attention has been paid to the complex structure of American higher education.

Later in the analysis, because of inadequate data, two of the institutions labeled "unhealthy" were replaced by two other "unhealthy" institutions. These two institutions constituted one-third of the six "unhealthy" institutions used in calculating the discriminant function to distinguish between healthy and unhealthy institutions. With a sample as small as this, the particular institutions selected can materially affect the conclusions, yet the criteria for selecting the institutions added to or replaced in the sample are never explained.

Standard procedure in discriminant analysis with relatively small samples (under 200 cases) is to draw a second sample for cross-validation with the first. Internal cross-validation was clearly required in this instance, where only 19 institutions were used in the initial discriminant analysis, in order to test the stability of the results: that is, the stability of the variables selected to distinguish among the groups and the stability of the weights, or the relative importance, assigned to each variable. A different small sample could yield very different results.

The base population of institutions from which the study sample was drawn comprised those institutions on the U.S. Office of Education's 1974 HEGIS survey tape. The final analysis included 2,163 institutions with adequate data and excluded 1,024 institutions with inadequate data. The total (3,187) is larger than the number of institutions reported in the Office of Education Directory as being in the 1974 population. This discrepancy needs explanation.

Of the institutions excluded, 420 were public, and 604 were private; these figures represent about one-quarter of the public sector and one-third of the private sector. More detailed comparisons of the included with the excluded institutions should be provided as a better basis for assessing the nature and degree of the biases that might have been introduced into the analysis. Given the large amount of missing data, an improved procedure would involve matching "missing-data" institutions with "complete-data" institutions and devising a sampling design that allows representation of the entire population.

In the study as reported, we do not know precisely what population was studied. Therefore, any generalizations about national financial conditions based on this analysis are less reliable than would be those drawn from more carefully defined samples of the population.

Narrowness of the Information Base

The 55 institutions in the sample were ranked on a scale from 1 (very unhealthy) to 5 (very healthy) by a panel of economic and financial analysts. The panel members were provided with 46 financial ratios along with trend data on enrollments, revenues and expenditures for each institution for the three years from fiscal 1972 to fiscal 1974. Seven panel members participated in the ranking process; an eighth panel member declined

to rank the institutions on the grounds of insufficient data. The ratings were averaged and compared with an expected normal distribution, and institutions at the extremes were categorized as "healthy" and "unhealthy." A total of 13 institutions were characterized as "healthy" and six as "unhealthy."

Next, equations were derived, using variables associated with these 19 institutions, to determine which variables did the best job of differentiating between the unhealthy and healthy institutions. These equations were used to group the remaining 36 of the 55 sample institutions and then to group the 2,163 institutions in the national sample for which sufficient data existed.

The 19 institutions whose ratings formed the foundation of the study, are grouped, by type and control, as follows (the first number is the subtotal of institutions ranked "with confidence" in the procedure, and the second number is the total of institutions in each cell of the sample of 55 institutions submitted to the panel:

	Public			Private			
	University	Four-Year	Two-Year	University	Four-Year	Two-Year	Total
Healthy	3/5	3/9	5/16	2/3		0/2	
Unhealthy			3/16		3/20		
							19/55

Of the 19 institutions used to derive the basic equation for discriminating between healthy and unhealthy institutions, only five are private; of these, two were rated "healthy" and three were rated "unhealthy."

The ranking of the 19 institutions (14 public and five private) carried much of the burden of the subsequent analysis as it is described in the Technical Notes to the article. This constitutes an extremely narrow base for making statements about the financial health of the nation's colleges and universities.

Application of Discriminant Analysis

Discriminant analysis is a statistical technique for defining a function (drawing a line or a plane) which does the best job of making groups of observations as statistically distinct as possible (maximizing the squared distances of the observations from the line or plane).

Application of discriminant analysis as reported in this study involved two phases: first, defining distinct groups of institutions; and second, classifying previously unclassified institutions. The first phase was carried out in three stages: (a) defining distinct groups by means of the panel's ranking of financial health; (b) generating the equations which discriminated best among the groups, using as discriminating variables selected institutional characteristics (financial ratios and trend data); and (c) assessing how well the process worked by analyzing the degree of confidence with which the discrimination between the groups can be derived from the variables used in the equation.

The second part of the analysis was to group the previously unclassified institutions, using the weights from the equations based on the characteristics of the institutions classified in the first phase.

In theory, discriminant analysis is an appropriate technique for classifying institutions by financial condition; but in this case, the application was underdeveloped and thus was very shaky. Problems with this particular application included, at the outset, the incomplete consensus among the panel members in their initial ranking of institutions--the ranking from which the discriminant function was derived. Not one of the 55 institutions was ranked in the same group by all seven panelists; indeed, six institutions was ranked as "very healthy" and as "very unhealthy" at the same time by panelists who

did not agree with each other. The spread of rankings across the five possible groupings was as follows:

Number of Different Groups in Which Institutions Were Ranked:	Number of Institutions in the Sample: Total	Public	Private
All panelists ranking in the same group:	0	0	0
Across 2 groups	8	6	2
3	23	9	14
4	18	11	7
Across all 5 groups	6	4	2
Total	55	30	25

The validity of the entire analysis depends on the precision of the initial grouping of institutions, but as the preceding table indicates, agreement among the panelists was not very high.

The validity of the analysis also depends on the variables used to discriminate among the groups. To the extent that there is error in the initial groupings, this error affects the selection of variables--that is, the 16 key indicators--used to identify differences in financial health among the groups.

For the purposes of the discriminant analysis, as described in the Technical Notes, only two groups of institutions, "healthy" and "unhealthy," were derived from the original panel rankings. One discriminating equation was generated to differentiate between these two groups. But the report itself presents data based on five levels of health; such a classification requires five distinct groups, for which four discriminating equations could be generated.

Arbitrariness of the Scale of Financial Health

It is unclear from the one-page technical note precisely how the essentially relative rankings were transformed into absolute categories of financial condition. The initial rankings from 1 to 5 tend to be more relative than absolute because (as the study was intentionally carried out) the panelists had no previously agreed-upon definition of financial health. Even the consistent application of chosen absolute standards by individual panelists (who may well have differed from each other) become relative when aggregated. Because not a single one of the institutions was ranked the same by all the panelists, when the ranks were averaged, the range was restricted to narrower limits than the original 1 to 5; it was narrowed to a 3.25-point spread from the possible 5. The authors then transformed the 3.25 spread based on relative rankings back into five absolute groups, labeled A (healthy) through E (unhealthy), and a very particular substantive meaning was attached to each group: for instance, "relatively unhealthy" is defined as a condition "which might be turned around by good management" and "unhealthy" as a situation "where the institution's long-term survival is problematic unless some major external intervention occurs." These are the authors' interpretations; they do not flow from the data as such, and they do not necessarily reflect the formulations of the panelists who ranked the institutions.

The distribution of the panel scores was transformed so that the average score was set at zero and the scores of the rest of the institutions were arrayed above and below that average. Designation of the five categories of health were then set at intervals one and three standard deviations above and below that average. But the designation of

"relatively unhealthy" as up to one standard deviation below the mean and "unhealthy" as more than one standard deviation below the mean is entirely arbitrary.

Using this standard to support a statement that 40 percent of the institutions are "unhealthy" is equivalent to saying that 40 percent of the population are "short." Forty percent of a normally distributed population would be in the bottom two categories defined by the authors simply as a result of the properties of a normal distribution. The statistical expectation that 40 percent of the institutions would, by definition, be "unhealthy" or "relatively unhealthy" tends to desensationalize the finding that 49 percent of the institutions are located in these two categories. As a matter of fact, almost as high a proportion (43 percent) of the institutions are located in the "healthy" and "relatively unhealthy" categories, but the report does not emphasize to this point.

Circularity in the Model

The discriminant analysis is technically flawed in several serious respects. Using the control and type of institutions (such as private, or two-year) as explanatory variables introduces circularity into the analysis. In calculating the financial health score, private institutions at the outset are given a negative weight in the equation. Consequently, taking a private institution and a public institution which are exactly equal on every other variable used in the discriminant analysis, the private institution would show up as less healthy than the public institution. Similarly, two-year institutions are given a positive weight in computing the financial health score--so that two-

year institutions automatically are given a higher health score even if they are absolutely identical in every other respect to a four-year institution.

Further, if the variables used to characterize the financial health of the institution are not themselves normally distributed, then the composite scores of the institutions will be skewed, not necessarily because more institutions than expected are "unhealthy" but simply as an artifact of the computational procedure.

Still further, the model used in the analysis is a linear model. In a linear model if something is good, more of it is better. But it is entirely possible that some of the relationships between the variables and financial health are not linear. Take, for instance, the ratio of current revenues to current expenditures, where a balanced budget (indicated by a ratio of 1.0) may be healthy but either large deficits (ratio 0.8) or large surpluses (ratio 1.2) may be unhealthy.

Finally, there may be interaction effects among the variables which should be taken into account in the analysis.

Measures of Statistical Confidence Reported

In describing the analysis, the authors report measuring statistical confidence levels. The reader who does not have a technical background in statistics is led to conclude from these statements that the analysis is solid. But the statements in the article about the levels of confidence of the statistical results are somewhat misleading.

For instance, according to the Technical Note: "This weighted scale contained over 97 percent of the discriminating information present in the sample . . ." In a discriminant analysis where the number of explanatory variables is greater than the total number of cases used in the

analysis, however, the system is mathematically fully determined: that is, all of the differences among the groups are computationally "explained," but the explanation has very little substantative meaning. In fact, sets of random nonsense variables would also "explain" the grouping.

At the outset, confidence levels were used in deciding whether institutions at the extremes of the rankings were "healthy" or "unhealthy": "Healthy institutions were labeled as such because the expert panel's average rating placed them far enough out on the 1 to 5 scale for one to say: 'There is only 1 chance in 100 that such a high rating resulted from pure chance.'" But computation of such confidence levels requires that the underlying data be normally distributed, which it may not be, and that the 1-5 scale be truly an interval scale, where the distance on the scale from 1 to 2 is the same as that from 4 to 5. The scale used by the panelists is probably more accurately described as a rank-ordering (i.e., ordinal scale) than as an interval scale so that the statements about confidence levels are not quite so solid as they purport to be.

Use of the Same Indicators for both Private and Public Institutions

A fundamental concern is that the authors failed to ask a key question which is central to the analysis: are the same financial indicators equally meaningful for public and for private institutions? All the institutions were treated as one undifferentiated population. Control and type (such as private institution, or two-year college) were used to explain the differences in financial condition, rather than as variables for grouping the institutions with different governance and financial structures. Rather than assuming that the same indicators can

be used for all groups of institutions, the authors should have posed this as the first question to be answered before proceeding any further with the analysis.

Interpretation of the Sixteen Key Health Indicators

The selection and interpretation of the 16 key health indicators reflects reliance on raw statistical results rather more than on coherent understanding of the financial operations of higher education institutions. And, as the authors acknowledge, there is no confirmation that the sixteen variables selected by the statistical procedures for grouping the institutions according to financial condition were the ones used by the panel in their original rankings, but merely that by using these variables, the computer could "mimic" the rankings.

A concept of long-run financial equilibrium has important implications for the definition of financial health of higher education institutions. Pioneering work is being done on this concept by William Massy and David Hopkins at Stanford University. Andrew Lupton and John Augenblick are familiar with this work and acknowledge its significance, but they do not operationalize it in their analysis. This is evidenced by the 16 variables selected by raw statistical procedures as "the most reliable" in indicating health. The variables are not yet integrated into any coherent "theory of the educational firm" and consequently represent a rather mixed bag.

This shortcoming in the analysis can be illustrated by a number of the authors' conclusions with respect to the indicators. Long-run financial equilibrium involves (a) levels of expenditures and revenues and (b) rates of change in these financial flows over time to insure

that they are in a sustainable relationship to each other. The raw statistics used in the analysis yield data from which the authors conclude that rates of change in expenditures are more useful in determining financial health than are rates of change in revenues--yet it is the relationship between expenditures and revenues which is at the very core of a definition of financial health.

Another conclusion drawn by the article is that increasing undergraduate enrollment is associated with health and that relatively slow growth in educational and general expenditures is also associated with health. But clearly a healthy institution must have a balanced relationship between enrollment growth and growth in educational and general expenditures.

A high ratio of freshman enrollment to total undergraduate enrollment is associated with healthy institutions; yet this conclusion implies that the higher the attrition rate, the healthier the institution is.

High tuition revenues in relation to student aid revenues (from outside sources) are associated with healthy institutions; the inference here is that those institutions which rely less on external funds to support student aid are in better financial condition. If this means that those institutions are healthiest which rely most on internal funds to support student aid, we see here an example of the strange effects that can be produced when the type of institution is confounded with the type of student body: at some institutions, increases in internally funded student aid have been closely associated with financial exigency.

We are told that statistically the tuition/student aid revenues ratio and the tuition/student aid expenditures ratio are positively

correlated, and this is very likely. But the student aid burden which affects the financial conditions of institutions is the difference between revenues and expenditures, not the correlation between them. At many institutions, this difference constitutes a large student aid deficit, as general funds are spent in addition to the revenues earmarked for student aid. The student aid deficit is not among the 46 indicators tested but would seem to be a much better indicator of the effects of student aid on the financial condition of higher education institutions than the measures that were included.

Many of the bizarre statistical results would disappear, I believe, if, instead of putting all institutions into a single statistical pot, the authors had first grouped them by financial structure and academic mission and then searched for meaningful indicators to make comparisons within and among groups.

Throughout the analysis, financial health is associated with holding down costs. For instance, healthy institutions are those which have:

-- lower growth rates of educational and general expenditures,

-- larger decreases in expenditures for plant additions,

-- lower costs per degree awarded, and

-- lower plant assets per enrolled student.

Educational diversity in the United States would be seriously jeopardized by making gross policy prescriptions on the basis of these conclusions about costs without first carefully considering the academic missions of different types of institutions and the relation of costs to the quality objectives of each type of institution.

The analysis should be redone using institutional types as classifying rather than as explanatory variables, and the implications

of the financial ratios that emerge from the statistical analysis should be reexamined to see whether they may not in reality serve more to describe a type of institution than to explain its financial condition--as is the case, for instance, with the graduate FTE/undergraduate ratio.

Reliance on HEGIS Data

The basic data for the analysis were taken exclusively from the HEGIS (Higher Education General Information Survey) reports made by institutions to the Office of Education. Analysts working closely with the HEGIS data have discovered large-scale omissions and inconsistencies. It is true, however, that HEGIS data are the only data available on a national basis, and their use is often justified because the alternative of generating new data from operating statements and balance sheets restructured for consistency across institutions, even if technically possible, is probably prohibitively expensive.

There is, however, a still more fundamental difficulty with using HEGIS data to analyze the financial conditions of colleges and universities. HEGIS data are constructed, as are institutional books, on traditional fund accounting principles, with separate accounts for each major source of funds. This accounting system was developed over the years to serve fiduciary requirements to report to those providing funds to academic institutions, not to serve the information needs of the managers of operating enterprises. The basic problem in straight fund accounting is that there is no "bottom line." A number of treasurers of higher education institutions are experimenting with consolidated formats for their financial statements. It is unlikely that solid, dependable statements can be made about the general financial conditions of colleges and universities until innovations in the accounting field

leading to a more comprehensive understanding of each institution as a whole take hold over the next several years. Until that time, any generalizations about financial conditions of colleges and universities will be vulnerable to serious challenge.

Treatment of the Panel Ratings as "Consensus" on Financial Indicators

The word consensus connotes active agreement rather than merely statistical averaging. At no time during the rating process, however, did the panel agree upon, or even discuss, what constitutes financial health. Only after the ratings were made, not before, did the authors use statistical techniques to attach meaning to the ratings. Up to this point in the analytic process, the panel had not reached a consensus, in the common sense of the word, on:

-- how financial health should be defined,

-- how the relative ranking of the institutions is related to the definition of health,

-- which indicators are most useful in assessing health, and whether they are equally applicable to both public and private institutions,

-- how the indicators finally selected for characterizing financial condition should be interpreted, or

-- whether the overall conclusions about the health of the nation's colleges and universities as reported in the article are valid.

The analysis underlying the Change report is incomplete. It cannot currently be used as a solid foundation for deriving conclusions about the financial health of all institutions, nor for financial self-study by individual institutions.

This memorandum is based on the report as published and on tabulations of institutional rankings sent to the panelists who participated in the first phase of the study. A more extended technical documentation of the procedures which is being prepared by the authors was not yet available. Only two of the panelists saw the report in draft form before it was published.

In preparing this memorandum a number of people contributed helpful insights and information: Paula Knepper and A. Jackson Stenner on discriminant analysis, Cathy Henderson on HEGIS data, and Sharon L. Coldren and Ben Laden on interpretation of financial indicators. John Minter also provided the results of a special analysis of the data which he performed and submitted to the New Jersey staff as the justification for his basic reservations about the ranking procedure.